

REMARKS

Allowance of this application is respectfully requested in light of the above amendments and the following remarks.

The claims are amended to clarify and emphasize the claimed subject matter. Support for the amended claims is the same as that noted in the previous response.

Claims 27-32, 37 and 38 stand rejected, under 35 USC §103(a), as being unpatentable over Laroia et al. (US 6,819,930) (newly applied) in view of Parantainen et al. (US 7,092,373). Claims 33 and 34 stand rejected, under 35 USC §103(a), as being unpatentable over Laroia et al. (US 6,819,930) in view of Parantainen et al. (US 7,092,373) and Khan (US 2004/0179493). Claims 39 and 40 stand rejected, under 35 USC §103(a), as being unpatentable over Laroia et al. (US 6,819,930) in view of Parantainen et al. (US 7,092,373) and Li et al. (US 2002/0119781). The Applicant respectfully traverses these rejections in accordance with the points set forth below.

Amended claim 27 defines:

*A base station comprising:
an allocation unit configured to allocate an uplink resource, comprising a frequency resource and a spreading code resource, to be used by a mobile station for transmitting an ACK/NACK signal in response to user data transmitted from the base station to the mobile station;
a modulating unit configured to modulate control information, that is directed to the mobile station and that includes both first allocation information indicating the uplink resource and second allocation information that comprises downlink resource allocation information and that indicates a destination of the user data; and
a transmitting unit configured to transmit, to the mobile station, the modulated control information including the first allocation information and the second allocation information to be simultaneously transmitted on a control channel and configured to transmit, to the mobile station, the user data on a user channel.*

A feature of the Applicant's claimed invention is thus which the first allocation information, indicating an uplink resource comprising a frequency resource and a spreading code

resource, and the second allocation information, that is comprised of downlink resource allocation information and that indicates a destination of the user data, are simultaneously transmitted to the same mobile station by virtue of being included in the modulated control information.

If either one of the uplink resource allocation and downlink resource allocation is not successfully received at the mobile station, a retransmission of the user data is necessary. That is, if the downlink resource allocation fails to be received at the mobile station, the mobile station can not receive the user data because the mobile station cannot recognize the destination of the user data. In such a case, the mobile station transmits, to the base station, a NACK signal that indicates that the mobile station has not successfully received the user data. Also, if the uplink resource allocation fails to be received at the mobile station, the mobile station cannot feedback the ACK or NACK signal to the base station because the mobile station cannot recognize a resource to be used for transmitting the ACK/NACK signal. In such a case, the base station cannot be informed whether the mobile station has successfully received the user data or not, and the base station must retransmit the user data.

In an environment where an error rate of a single transmission is 5% and a success rate at the single transmission becomes 95%, in a case where the uplink resource allocation and the downlink resource allocation are separately transmitted, a success rate at which both the uplink resource allocation and the downlink resource allocation are successfully received at the mobile station is 90.25% ($=95\% \times 95\%$) and an error rate at which either one of the uplink resource allocation and the downlink resource allocation failed to be received becomes 9.75%. On the other hand, in a case where the uplink resource allocation and the downlink resource allocation are simultaneously transmitted, the success rate at which both the uplink resource allocation and

the downlink resource allocation are successfully received is 95% and the error rate becomes 5%.

Therefore, it is noted that the instant claimed invention enables the overall number of retransmissions to be reduced by simultaneously transmitting the first allocation information and second allocation information.

The Applicant's claimed invention distinguishes over Laroia in terms of at least the following points: a base station includes *inter alia* a transmitting unit configured to transmit modulated control information including first allocation information and second allocation information to be simultaneously transmitted to the same mobile station, wherein the first allocation information indicates the uplink resource comprising a frequency resource and a spreading code resource and the second allocation information comprises downlink resource allocation information and indicates a destination of the user data.

Laroia discloses a system in which a base station assigns a traffic segment to a wireless terminal, and the assignment of the traffic segment is associated with an assignment segment that is transmitted on the downlink, with the assignment information of a traffic segment being conveyed in the associated assignment segment. The essential information to be contained in an assignment segment is the identifier of the wireless terminal for utilizing the associated traffic segment. See, col. 5, lines 44-47. In addition, Laroia states that the assignment segment can include some physical layer parameters such as coding rate and bits-per-symbol to be used in the associated traffic segment; this would allow those physical layer parameters to be rapidly changed on a segment by segment basis. See, col. 5, lines 51-55.

In Laroia, a traffic segment is defined as a combination of prescribed time slot and waveform set indices. In general, a traffic segment contains prescribed waveforms over a

prescribed finite time interval. See, col. 3, lines 50-53. Each assignment segment is associated with a traffic segment in a predetermined manner, such as one-to-one or one-to-many relationship. See, col. 4, lines 34-41. Laroia discloses two types of assignment segments, one associated with a downlink traffic segment and the other associated with an uplink traffic segment. FIG. 4 shows the logical flow of assigning traffic segments. Col. 5, line 65 – col. 6, line 8 states:

The base station 101 transmits the assignment segments in the downlink. All the active wireless terminals 103 monitor all the assignment segments to see whether their user identifiers appear in the assignment segments. As shown in FIG. 4, wireless terminal 103-1 sees its identifier 401 in the assignment segment for downlink traffic segment #1 402, and thus receives traffic in the assigned downlink traffic segment #1 402. Meanwhile, wireless terminal 103-2 sees its identifier 403 in the assignment segment for uplink traffic segment #1 403, and thus transmits traffic in the assigned uplink traffic segment #1 404.

The Applicants respectfully note that Laroia explicitly describes that the assignment segment for the downlink traffic segment and the assignment segment for the uplink traffic segment are separate (see, col. 4 lines 8-10, and FIG. 4). In contrast, in present claim 27, the first and second allocation information control information are included in the control information and thus are not separate as in Laroia.

Laroia also explicitly describes that the assignment segment for the downlink traffic segment is transmitted as early as the associated downlink traffic segment and the assignment segment for the uplink traffic segment is transmitted strictly earlier than the associated uplink traffic segment; see, col. 5 lines 22-25 (relating to Fig. 4) which states:

Therefore, in the downlink, the traffic segment 304 can be as early as the associated assignment segment 303, while in the uplink, the assignment segment 303 is generally strictly earlier than the traffic segment 304.

In Laoria's Fig. 4 embodiment, the assignment segment for the downlink traffic segment

and the assignment segment for the uplink traffic segment are directed to different terminals, respectively; col. 6, lines 1-8 states:

As shown in FIG. 4, wireless terminal 103-1 sees its identifier 401 in the assignment segment for downlink traffic segment #1 402, and thus receives traffic in the assigned downlink traffic segment #1 402. Meanwhile, wireless terminal 103-2 sees its identifier 403 in the assignment segment for uplink traffic segment #1 403, and thus transmits traffic in the assigned uplink traffic segment #1 404.

Fig. 4 does not teach or suggest that the assignment segment for the downlink traffic segment and the assignment segment for the uplink traffic segment would be simultaneously transmitted. Although Laoria discloses that the assignment segment for the downlink traffic segment and the assignment segment for the uplink traffic segment may be coded together, this does not mean that such coded assignment segment for the downlink traffic segment and assignment segment for the uplink traffic segment are transmitted together, according to the knowledge of the person skilled in the art. In contrast, in present claim 27, the transmitting unit is configured to transmit, to the mobile station, the modulated control information including the first allocation information and the second allocation information to be simultaneously transmitted on a control channel and configured to transmit, to the mobile station, the user data on a user channel. Thus, in claim 27, the first allocation information and the second allocation information are simultaneously transmitted on a control channel as included in the control information.

Laoria notifies the traffic segment assigned to the terminal by associating, in a predetermined manner, the assignment segment with the assigned traffic segment. However, the assignment segment contains the identifier of the terminal as essential information and need not contain a resource parameter such as a time slot and a wave form of the assigned traffic segment (see, col. 5 lines 44-51). From the view of the purpose of Laoria's invention where the traffic

segment is associated with a particular assignment segment including the identifier so that overhead in transmitting the assignment segment is significantly reduced and the terminal can detect the traffic segment by the identifier and the association without explicit resource parameter, it is reasonably understood that Laoria teaches away from the assignment segment including a resource parameter. Also, the physical layer parameters are different from the resource parameters.

In contrast, in claim 27, the uplink resource comprises a frequency resource and a spreading code resource, to be used by a mobile station for transmitting an ACK/NACK signal in response to user data transmitted from the base station to the mobile station.

That is, Laoria teaches that the assignment segment for a downlink traffic segment need not include downlink resource allocation information but it is essential that the assignment segment is pre-associated with the downlink resource allocation. This is because Laoria notifies the assigned traffic segment to the terminal by pre-associating the assignment segment with the traffic segment that has a specific resource, and this means that the resource, that includes a time slot (timing) and a waveform (frequency), depends on the assigned traffic segment. Therefore, the transmission timings of the assignment segment for the downlink traffic segment and the assignment segment for the uplink traffic segment depend on the assigned downlink traffic segment and the assigned uplink traffic segment, respectively. Laoria nowhere teaches that the assignment segment for the downlink traffic segment and the assignment segment for the uplink traffic segment are transmitted together.

Accordingly, it is submitted that the above features of the Applicants' claimed invention are not disclosed in Laoria and the deficiencies of Laoria are not cured by Parantainen.

The Applicants note that, in the instant claimed invention, with respect to the first

allocation information, that this allocation information indicates the uplink resource comprising a frequency resource and a spreading code resource. On the other hand, Laroia assigns the traffic segment that is associated with a time slot and a waveform (see, col. 3 lines 54-59, and FIG. 4):

In a given system, different traffic segments may contain time slots having time intervals of different duration and having waveform sets with different bandwidths. For example, as shown in FIG. 2, traffic segment #1202 contains one time slot and two waveforms, while segment #2203 contains two time slots and four waveforms.

Also, in Parantainen, the assigned uplink resource for ACK/NACK is comprised of a time slot; see, col. 6, lines 55–64 and col. 7, lines 8-18 which state:

The objectives of the invention are fulfilled by providing a procedure, in which the one and same uplink control channel is used for transferring uplink control information, that relates to at least two downlink TBFs. This is achieved by including in the uplink control message information on which downlink time slot the concerned TBF is transferred. It is also preferably achieved by including in a downlink control message information on which uplink time slot control information is transferred corresponding to a determined TBF.

Further, the invention can be implemented in GPRS by, for example, introducing a new field, UPLINK_CONTROL_TIMESLOT, while assigning a downlink TBF or reallocating the resources of a downlink TBF in order to inform the MS of which uplink timeslot to use for sending control messages for that particular TBF. In this context, it is also preferable to use the RRBP to specify a single uplink block on the UPLINK_CONTROL_TIMESLOT in which the mobile station shall transmit either a PACKET CONTROL ACKNOWLEDGEMENT message or a PACCH block to the network. (Emphasis added.)

Parantainen is silent with respect to an uplink resource comprising a frequency resource and a spreading code resource.

Li is cited only against dependent claims, and its deficiencies are discussed in the previous response.

Accordingly, the Applicants respectfully submit that the teachings of Laroia and Parantainen, even if combined as proposed in the pending Office Action, still would lack the

above-noted features of claim 27 and thus these references, considered individually or in combination, do not render obvious the subject matter now defined by claim 27. Independent claim 30 now similarly recites the above-mentioned subject matter distinguishing apparatus claim 27 from the applied references, but with respect to a method. Claims 37 and 38 are allowable for similar reasons that claim 27 is allowable and for the additional reason of reciting subject matter of encoding the first allocation information indicating the uplink resource together with second allocation information that a downlink resource allocation information and that indicates a destination of the user data to provide encoded first and second allocation information.

Therefore, allowance of claims 27, 30, 37 and 38 and all claims dependent therefrom is considered to be warranted.

In view of the above, a Notice of Allowance is respectfully solicited.

If any issues remain that may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

/James Edward Ledbetter/

Date: November 2, 2010
JEL/att

James E. Ledbetter
Registration No. 28,732

Attorney Docket No. 009289-05198
Dickinson Wright PLLC
1875 Eye Street, NW, Suite 1200
Washington, DC 20006
Telephone: (202) 457-0160
Facsimile: (202) 659-1559

DC 9289-5198 163382